Introduction and Survey Objectives

In 2017, the Department of Natural Resources conducted a one night electrofishing survey of Silver Lake in order to provide insight and direction for the future fisheries management of this water body. Primary sampling objectives of this survey were to characterize species composition, relative abundance, and size structure. The following report is a brief summary of that survey, the general status of the fish populations and future management options for Silver Lake.

Acres: 71   Shoreline Miles: 1.3   Maximum Depth (feet): 17
Lake Type: Seepage   Public Access: One Public Boat Launch
Regulations: Statewide Default Regulations

WISCONSIN DNR CONTACT INFO.

Jason Breeggemann—Fisheries Biologist
Elliot Hoffman - Fisheries Technician
Wisconsin Dept. of Natural Resources
647 Lakeland Rd.
Shawano, WI 54166

Jason Breeggemann phone and emial:715-526-4227; jason.breeggemann@wisconsin.gov

Elliot Hoffman phone and email: 715-526-4231; elliot.hoffman@wisconsin.gov

Survey Information

Site location	Survey Date	Water Temperature (°F)	Target Species	Total Miles Shocked	Number of Stations	Gear	Number of Netters
Silver Lake	5/23/2017	58	All	1.27	3	Boomshocker	2

Survey Method

- Silver Lake was sampled according to spring electrofishing (SEII) protocols as outlined in the statewide lake assessment plan. The primary objective for this sampling period was to count and measure adult bass and panfish. Other gamefish may be sampled but are considered by-catch as part of this survey.

- The entire shoreline was sampled with a boomshocker. All fish captured were identified to species and all gamefish and panfish were measured for length. A subsample of fish were weighed and age structures collected for age and growth analysis.

- Fish metrics used to describe fish populations include proportional stock density, catch per unit effort, length frequency distribution, and mean age at length.

Fish Metric Descriptions
PSD, CPUE, LFD, and Growth

Proportional Stock Density (PSD) is an index used to describe size structure of fish populations. It is calculated by dividing the number of quality size fish by the number of stock size fish for a given species. PSD values between 40 - 60 generally describe a balanced fish population.

Catch per unit effort (CPUE) is an index used to measure fish population relative abundance, which simply refers to the number of fish captured per unit of distance or time. For electrofishing surveys, we typically quantify CPUE by the number and size of fish per mile of shoreline. CPUE indexes are compared to statewide data by percentiles. For example, if a CPUE is in the 90th percentile, it is higher than 90% of the other CPUEs in the state.

Length frequency distribution (LFD) is a graphical representation of the number of fish captured by half inch or one inch size intervals. Smaller fish (or younger age classes) may not always be represented in the length frequency due to different habitat usage or sampling gear limitations.

Mean Age at Length is an index used to assess fish growth. Growth structures (otoliths, spines, or scales) are collected from a specified length bin of interest (e.g., 6.5 - 7.5 inches for bluegill). Mean age is compared to statewide data by percentile with growth characterized by the following benchmarks: slow (<33rd percentile); moderate (33rd to 66th percentile); and fast (>66th percentile).

Size Structure Metrics

Species	Total	Average Length (inches)	Length Range (inches)	Stock and Quality Size (inches)	Stock No	Quality No	PSD	Percentile Rank	Size Rating
BLUEGILL	420	4.3	2.0 - 9.0	3.0 and 6.0	307	46	15	28	Low
BLACK CRAPPIE	30	8.2	5.8 - 12.4	5.0 and 8.0	30	16	53	64	Moderate
LARGEMOUTH BASS	85	10.8	6.5 - 16.6	8.0 and 12.0	79	19	24	13	Low
PUMPKINSEED	54	5.3	2.8 - 7.5	3.0 and 6.0	50	15	30	57	Moderate

Abundance Metrics

Species	CPUE Total (number per mile)	Percentile Rank	Overall Abundance Rating	Length Index	Length Index CPUE	Length Index Percentile Rank	Length Index Abundance Rating
BLUEGILL	420.0	95	High	≥ 7.0 inches	27.0	83	High
BLACK CRAPPIE	30.0	84	High	≥ 10.0 inches	2.0	80	High
LARGEMOUTH BASS	66.9	91	High	≥ 14.0 inches	9.4	85	High
PUMPKINSEED	54.0	94	High	≥ 7.0 inches	5.0	90	High

Bluegill Length Frequency

N = 420
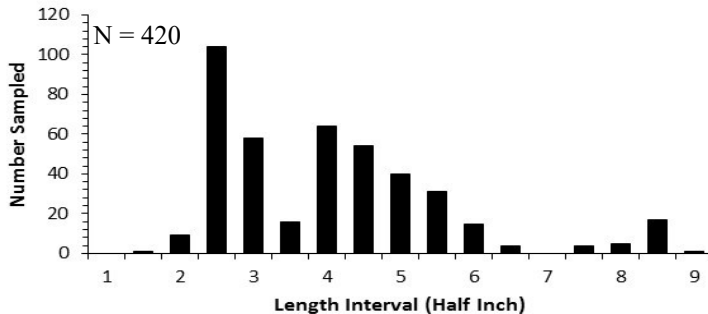
Black Crappie Length Frequency

N = 30
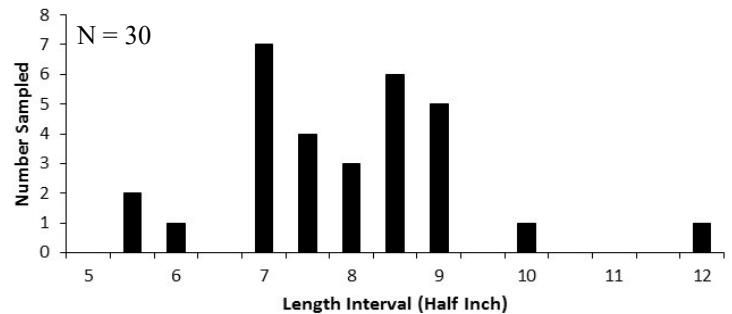
Largemouth Bass Length Frequency

N = 85
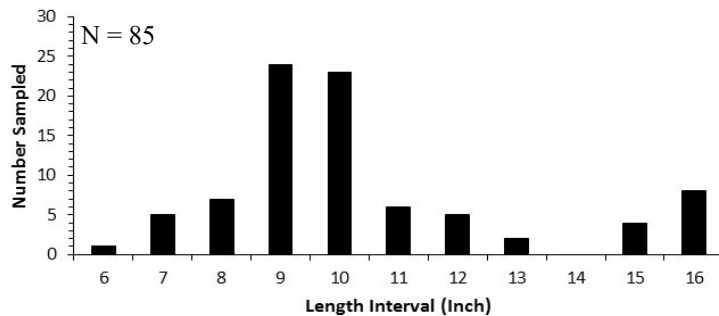
Pumpkinseed Length Frequency

N = 54
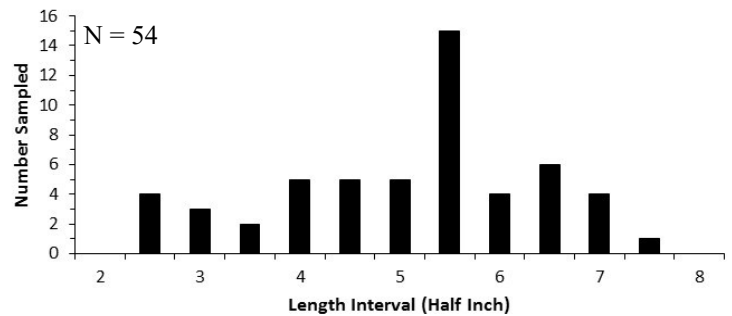
Summary

- A total of 599 fish from six species were collected during our survey. The most frequently encountered and common species were bluegill (420), largemouth bass (85), and pumpkinseed (54).

- Other fish species sampled in lower abundance include black crappie (30), northern pike (9), and green sunfish (1).

- All fish species captured were native species.

- Largemouth bass were the dominant gamefish captured in our survey. Largemouth bass densities were high and the majority of the individuals captured were ≤ 12 inches. Silver Lake also provides a quality largemouth bass fishery as 9.4 largemouth bass > 14.0 inches were captured per mile of electrofishing, which ranks at the 85th percentile statewide.

- Only nine northern pike were captured. However, fyke netting would be a more appropriate sampling technique to assess the northern pike population.

- The panfish population is comprised of bluegill, black crappie, pumpkinseed, and green sunfish. Bluegill were found at high densities. The majority of the individuals were < 6 inches in length. Bluegill 5.5 – 6.5 inches long grew very quickly. Given the high density of small individuals combined with the fast growth rates, it is likely that Silver Lake went through a winterkill 4-5 years ago and the bluegill population is dominated by individuals born in the last three years. Despite a population dominated by small individuals, Silver Lake has a high density of harvestable size bluegills when compared to other lakes in WI.

- Silver Lake supports high quality black crappie and pumpkinseed populations, with high densities of harvestable sized fish.

- During the last survey in 2009, only black bullhead, bluegill, and bluntnose minnow were captured. It is likely that Silver Lake went through a significant winterkill shortly before 2009. The current fishery is a marked improvement since the last 2009 survey.

Growth Metrics

Species	Total (N)	Length Bin (inches)	Mean Age (years)	Age Range (years)	Percentile Rank	Growth Rating
BLUEGILL	9	5.5 - 6.4	3	3	100th	Fast
BLACK CRAPPIE	6	7.5 - 8.4	7.2	3 - 8	4th	Slow

Management Options

This survey was primarily intended to assess largemouth bass and panfish populations. Other species are captured but different survey techniques are typically used to better assess their population metrics. Therefore, management recommendations are focused on bass and panfish.

Largemouth Bass

- The largemouth bass population was dominated by smaller individuals. Efforts should be made to control invasive submersed aquatic vegetation. If density of plants is too high, predators can not effectively forage and their growth rates slow. If future surveys show the bass population continues to maintain high densities dominated by smaller individuals, a special regulation aimed at harvest of smaller individuals should be considered.

Panfish

- The bluegill population was dominated by smaller individuals. Efforts should be made to control dense invasive submersed aquatic vegetation. Given the high densities of bluegill observed in 2017, it is not likely that the fast panfish growth rates observed will continue into the future because of increased competition for resources. If vegetation densities are lowered, predators will be able to reduce panfish densities and there will be more resources available for each individual.

Other Management Objectives

- Work with WDNR staff and local lake management organizations to manage invasive aquatic plants as necessary. High densities of invasive plants often inhibit the ability of predators to effectively forage resulting in slow growing predator populations. Additionally prey fish (e.g., bluegill) populations can become overabundant and slow growing when predators cannot effectively forage on them.